DARPA's Special Projects Office (SPO) is requesting white papers in the area of cold plasma neutralization for buildings. Responses should be targeted to support the Immune Building program, whose goal is to make military buildings less attractive targets for attack by airborne/aerosolized chemical or biological warfare agents (CWA, BWA), by modifying and augmenting building infrastructure to greatly reduce the effectiveness of any such attack. (For further details regarding the Immune Building program, see http://www.darpa.mil/spo/programs/immunebuilding.htm .) Neutralization of airborne contaminants in ventilation systems using cold plasma, alone or in combination with other approaches, has been proposed as an element of Immune Building systems, and this call for white papers is intended to offer specific guidance for offerors applying for funding in this area beginning in FY03. DARPA's intention is to fund several competitive approaches in the area of cold plasma, with the FY03 effort focused on (1) developing performance models that are validated by experimental data, and (2) exercising those models through trade studies that lead to conceptual designs for prototype systems, including quantitative performance estimates of system performance. Follow-on activities in FY04, should they be funded, are expected to include the building and testing of the prototype system.

This white paper is being requested under the provisions of DARPA Presolicitation Notice BAA 02-10, under which this office solicits innovative concepts for research efforts in advanced technologies. The site http://www.darpa.mil/baa/baa02-10.htm contains a full description of the BAA, including general procedures for submitting white papers. General format and content guidance for submitting white papers under this BAA can be found at the site http://www.eps.gov/EPSData/ODA/Synopses/4965/BAA02-10/Attachment2.doc. The present document supplements that reference and provides guidance specific to proposals for cold-plasma neutralization Note that the total allowable length of responses to this document (≤12 pages, including cover) is greater than the 4 pages cited in the previous link since this guidance requests specific information for a targeted purpose.

Please organize your response as follows:

I. Administrative (cover sheet, per general BAA 02-10 guidance) (1 page)

II. Technical (≤10 pages)

Please address the following points as clearly and concisely as possible. If the answers are unknown or would require testing / experimentation to better characterize, please indicate that as well.

1. Overview (approx 2 pages)
   Briefly describe the proposed cold (non-thermal) plasma neutralization approach and the features that distinguish it from other cold plasma applications. Show how it would be incorporated into an end-to-end system for neutralizing BWA/CWA in the airstream of building ventilation systems, including any other technologies in addition to cold plasma that are important in the overall concept for safely removing the contamination from the airstream (e.g. filtration, scrubbing, ultraviolet light, etc.). Include approximate dimensions of the hardware and any special constraints on the space(s) occupied by the complete system. Briefly summarize the important kill / neutralization mechanisms involved, including multiple kill mechanisms enabled by a single component of the system (e.g., if a single stimulus such as UV light causes cell death in several different ways, indicate all of those ways). Estimate the level of performance that might be feasible for such a system in an Immune Building application (approximately how many logs reduction for which

BWAs/CWAs for what airflow rate, cross-section, input power, etc.); and describe the basis for your estimate, including data and/or assumptions.

2. Performance Model Development (approx 5 pages)
   Describe the steps required to develop a validated, quantitative performance model for the key elements in the proposed system; i.e., a method of predicting the overall system neutralization capability as a function of system parameters (e.g., airflow rate, duct cross-section, input power, ambient humidity, physical configuration of the device). Differentiate between those relationships that are known and those that require further investigation. For the latter, identify the method(s) proposed to quantify each of these relationships (mathematical modeling? testing / experimentation? other?). The white paper should clearly describe how the proposed work will address the issue of kill mechanisms that are not mutually independent but interact cumulatively or destructively in some way.

3. Trade Study and Conceptual Design of Prototype System (approx 3 pages)
   Explain how you will use the system performance model to conduct a Trade Study that results in a conceptual design of a prototype optimized for an Immune Building application. Identify the factors that must be considered in addition to performance (e.g., operating lifetime; generation / handling / disposal of hazardous materials; exhaust temperature or humidity; downstream "residuals" and other safety issues; order-of-magnitude costs to acquire, operate, and maintain such a system), and specify how you propose to incorporate these factors into the trade study.

III. Estimated Project Cost and Schedule (1 page)

For each of the above elements (Performance Modeling; Trade Study and Conceptual Design), provide a schedule and a rough cost estimate for the proposed work. It is not necessary to submit detailed Cost and Pricing data at this time; instead, provide a top-level breakout in the following categories: labor, showing hours and cost; travel; subcontract (indicate type of material or services provided); other (e.g., materials, instrumentation, etc. not otherwise covered – describe briefly). The cost estimate should cover the work identified above as well as the costs for standard quarterly and final reviews and reports.

Evaluations will consider the potential benefit to the Immune Building program based on the proposed system concept; the likelihood that the proposed approach will provide the ability to accurately predict overall system performance; the plan for performing the trade study and downselecting to a conceptual design; and the cost realism / reasonableness of the proposed effort. Based on those responses received by 31 Dec 2002, DARPA/SPO may designate a limited number of respondents for full technical and cost proposals.

If you have further questions, please contact George Thompson, SETA support contractor, at George.Thompson@anser.org.